

FUEL CELL AND FUEL CELL STACK COMPRISING THE SAME

Examiner: Scully S.N.: 10/593,459 Art Unit: 1795 January 13, 2010

DETAILED ACTION

Priority

1. Acknowledgment is made of applicant's claim for foreign priority based on an application filed in Japan on December 28, 2004. It is noted, however, that applicant has not filed a certified copy of the JP2004-380634 application as required by 35 U.S.C. 119(b).

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 1 recites the limitation "said anode-side gap" and "said cathode-side gap" in lines 33 and 34. There is insufficient antecedent basis for this limitation in the claim. Further, the claim recites "an anode-side gap" and "a cathode-side gap" in lines 39 and 42, respectively, which is interpreted to be the gaps referred to initially, for purposes of compact prosecution. Appropriate correction is required.

4. Claims 6 and 7 recites the limitation "said first route" in line 5 of each claim.

There is insufficient antecedent basis for this limitation in the claim. For purposes of compact prosecution, the first route is assumed to be the same as that referred to in

claim 5 from which the claims do not depend and thus do not have antecedent basis therefrom. Appropriate correction is required.

5. Claim 9 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the claim recites "a flow direction of said cooling fluid that flows in an inside region of said cooling fluid channel from upstream to downstream and a flow direction of said reaction gas that flows in an inside region of said gas channel from upstream to downstream are substantially the same." This recitation does not indicate whether it intends to refer to *both* reactant gases (fuel gas and oxidant gas), or *either* reactant gas, or it is unclear which is intended. For the purposes of examination, it is interpreted to be both. Applicant is asked to clarify.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. Claims 1 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohara et al. (US2004/0209148).

With respect to claim 1, Ohara et al. disclose a polymer electrolyte fuel cell comprising a membrane electrode assembly having an anode (2a), a cathode (2b) and a polymer electrolyte membrane (1) disposed therebetween. An anode-side separator (10) and a cathode-side separator (20) are provided. A cooling fluid channel (14b, 24b) is provided between the separators of adjacent fuel cell units. See Figure 11. A fuel gas channel for supplying and exhausting a fuel gas to/from the anode separator and an oxidant gas channel for supplying and exhausting oxidant gas to/from the cathode separator are provided. See Figures 14 and 15. A cathode-side gasket (150) and an anode-side sealing member (180) are provided. Clearance is provided between the cathode (201) and the sealing member (150) represented by l_1 , and clearance between the anode (202) and the sealing member (180) is represented by l_2 . See Figure 43; paragraph [0252]. This configuration ensures discharge of water. See [0081].

Ohara et al. do not disclose the cooling fluid channel, fuel gas channel and oxidant gas channel to be substantially parallel, but disclose the coolant flow field to be perpendicular to the cathode and anode flow fields. However, it would have been obvious to one having ordinary skill in the art at the time of the invention to rearrange the flow fields to be parallel and thus have inlets and outlets on the same sides, since it has been held that rearranging parts of an invention involves only routine skill in the art.

In re Japikse, 86 USPQ 70. Upon parallel rearrangement, an upstream portion of the cooling fluid channel would correspond to a region of the anode and/or cathode side gaps and a middle stream portion would correspond with the fuel and oxidant gas channels.

With respect to claim 2, Ohara et al. disclose the polymer electrolyte membrane (203) to have a larger main surface than the electrodes (201, 202). The gaskets sandwich the entire periphery of the polymer electrolyte membrane (see Figure 38). The anode-side gap comprises boundaries of the anode, polymer electrolyte membrane and the anode-side gasket and the cathode-side gap comprises boundaries of the cathode, polymer electrolyte membrane and the cathode-side gasket. See Figure 43.

With respect to claim 3, the limitation is a method of use. Ohara et al. disclose the same configuration as discussed above with respect to claim 1, and thus it is the position of the examiner that the limitations of claim 3 would occur during use of the fuel cell. Further, Ohara et al. disclose the configuration having the clearance gaps ensures discharge of water. See [0081].

With respect to claim 4, Ohara et al. disclose the configuration as discussed above with respect to claim 1, wherein the upstream portions of the cooling fluid channels correspond to the anode/cathode clearance gaps and the middle stream portion correspond to the fuel/oxidant gas channels. See Figs. 34, 36 and 43, for example.

With respect to claim 5, Ohara et al. disclose the anode and cathode clearance gaps formed by continuous sealant members (which appear to have the same shape as

applicant's "continuous circular members") having coolant inlet and outlet manifolds.

See Figures 7, 9 and 43. The reactant inlet to outlet path is diagonally across the fuel cell stack, and thus both routes of Ohara et al. would be the same length. However, it would have been obvious to one having ordinary skill in the art at the time of the invention to rearrange the flow field inlets and outlets to be directly across from one another, since it has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japikse*, 86 USPQ 70.

With respect to claims 6 and 7, Ohara et al. disclose the configuration as discussed above with respect to claim 1, wherein the upstream portion of the cooling fluid channel corresponds to first and second routes of the anode/cathode side gaps.

With respect to claim 8, Ohara et al. disclose the configuration as discussed above with respect to claim 1, wherein the streams of the coolant and fuel and oxidant channels correspond to each other.

With respect to claim 9, the limitation is a method of use. Ohara et al. disclose the configuration as discussed above with respect to claim 1. It is the position of the Examiner that the flow fields would thus operate in substantially the same direction in view of *In re Japikse*, as discussed above.

With respect to claim 10, Ohara et al. disclose the channels to have a serpentine structure. See Figs. 34-36.

With respect to claim 11, Ohara et al. disclose a fuel cell stack comprising the fuel cells as discussed above with respect to claim 1. See Figure 11.

Contact/Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven Scully whose telephone number is (571)270-5267. The examiner can normally be reached on Monday to Friday 7:30am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on (571)272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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